IMMERSED INTERFACE METHODS FOR FLUID DYNAMICS PROBLEMS

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The immersed interface method developed in this talk is motivated by Peskin's immersed boundary (IB) method, and allows one to model the motion of flexible membranes or other structures immersed in viscous incompressible fluid using a fluid solver on a fixed Cartesian grid. The IB method uses a set of discrete delta functions to spread the entire singular force exerted by the immersed boundary to the nearby fluid grid points. Our method instead incorporates part of this force into jump conditions for the pressure, avoiding discrete dipole terms that adversely affect the accuracy near the immersed boundary.

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A fully implicit method that allows us to model immersed elastic boundaries with mass is also presented. This work is joint with Randy LeVeque at the University of Washington and Roberto Camassa at UNC, Chapel Hill.